WHAT IS CLAIMED IS:

1. A hydraulic control valve in which an actuator is installed, comprising:

a housing forming therein a control chamber, a high pressure passage in which a high pressurized fuel is supplied, a high pressure port communicated with the control chamber and the high pressure passage, a law pressure passage and a law pressure port communicated with the control chamber and the low pressure passage;

a valve member interposed between the high pressure port and the low pressure port to be movable therebetween, said valve member being affected by a pressure in the control chamber;

means for supplying energy to the actuator so that the supplied energy is kept therein, thereby making displacement the actuator;

means for interrupting the supply of energy so as to cause the actuator to discharge the kept energy, thereby making displacement the actuator; and

converting means operatively connected to the actuator and the valve member, and adapted to convert the displacement of the actuator corresponding to the kept energy into hydraulic pressure applied to the valve member, thereby moving the valve member so as to open the low pressure port and close the high pressure port,

said converting means converting the displacement of the actuator corresponding to the discharged energy into hydraulic pressure applied to the valve member, thereby moving the valve member so as to open the high pressure port and close the low pressure port,

wherein energy which the actuator requires to move the valve member so as to close the high pressure port is larger than energy which the actuator requires to move the valve member so as to open the low pressure port.

2. A hydraulic control valve according to claim 1, wherein said converting means comprises a hydraulic chamber for increasing and decreasing hydraulic pressure therein according to the displacements of the actuator, and a piston member subjected to the hydraulic pressure in the hydraulic chamber so as to move the valve member, and

wherein said low pressure port has an area expressed as S_L (mm^2), said high pressure port has an area expressed as S_H (mm^2), said hydraulic chamber has a volume expressed as V (mm^3), a volume modulus of the operating hydraulics in the hydraulic chamber is expressed as γ (Kg/mm^2), said piston member has an area on which the hydraulic pressure is received is expressed as SA (mm^2), a lift amount of the valve member moving from the low pressure port to the high pressure port is expressed as L (mm) and a pressure in the high pressure passage is expressed as P (Kg/mm^2), whereby the S_H, V, the γ, the SA, the L and the P are satisfied with the relationship by the following equation:

$$S_H \cdot P \cdot L + 1/2 \cdot (S_H \cdot P/SA)^2 \cdot V/\gamma > 1/2 \cdot (S_L \cdot P/SA)^2 \cdot V/\gamma$$

3. A hydraulic control valve according to claim 1, wherein said supplying means supplies to the actuator energy which is not less than the energy that the actuator requires to move the valve member so as to open the low pressure port and smaller than the energy that it requires to move

the valve member so as to close the high pressure port so that the converting means converts the displacement of the actuator corresponding to the supplied energy, thereby locating the valve member at a half lift position, said half lift position being positioned between the high pressure port and the low pressure port.

4. A hydraulic control valve according to claim 1, wherein said open of the low pressure port and close of the high pressure port make decrease the pressure in the control chamber and said open of the high pressure port and close of the low pressure port make increase the pressure therein, and

wherein said housing forms therein a hole communicated with the control chamber and is provided with a seat portion through which an injection hole is formed, said injection hole being communicated with the hole,

further comprising:

a needle contained in the hole to be movable so as to permit the needle to be seated on the seat portion, thereby closing the injection hole,

wherein said decrease of the pressure in the control chamber is applied to the needle so that the needle moves opposite to the seat portion to open it, thereby starting an injection of the fuel supplied from the high pressure passage, and

said increase of the pressure in the control chamber is applied to the needle so that the needle moves to the seat portion to close it, thereby interrupting an injection of the fuel supplied from the high pressure passage.

5. A control system for controlling a plurality of actuator devices in each of which an actuator is installed, said actuator being deformed according to an amount of energy, said energy being kept in the actuator by energization, said control system comprising:

means for storing thereon individual data each specifying a condition of the energization of each of the actuator devices, said condition of the energization permitting energy to be supplied to each of the actuator devices, said energy being required for making each of the actuator devices a predetermined operating state; and

means for setting the condition of energization to each of the actuator devices according to each of the stored individual data.

6. A control system for controlling a plurality of actuator devices according to claim 5, wherein said setting means is operative to convert the individual data into actual data according to a difference between an actual operating condition of each of the actuator devices and a reference operating condition thereof, said actual data corresponding to the actual operating condition of each of the actuator devices.

7. A control system for controlling a plurality of actuator devices according to claim 6, wherein said actual operating condition includes an actual temperature of each of the actuator, and said reference operating condition includes a reference temperature thereof.

8. A control system for controlling a plurality of actuator devices

according to claim 6, wherein said actual operating condition includes an actual amount of load applied on the actuator, and said reference operating condition includes a reference amount of load applied thereon.

9. A control system for controlling a plurality of actuator devices according to claim 6, wherein said actual operating condition includes an actual amount of extension of the actuator, and said reference operating condition includes a reference amount of extension thereof.

10. A control system for controlling a plurality of actuator devices according to claim 6, wherein each of said reference operating conditions of the actuator devices is a common operating condition among the actuator devices.

11. A control system for controlling a plurality of actuator devices according to claim 5, wherein said actuator of each of the actuator devices is a piezoelectric actuator, and said condition of energization includes a charging voltage of the piezoelectric actuator.

12. A control system for controlling a plurality of actuator devices according to claim 11, wherein each of said actuator devices comprises an high pressure port, a low pressure port and a movement member interposed between the high pressure port and the low pressure port, and is communicated with a common-rail, each of said actuator making displacement the movement member between the high pressure port and the low pressure port,

said actual operating condition of each of the actuator devices includes an actual temperature of each of the actuator, an actual pressure in the common-rail and an actual displacement amount of the movement member, said reference operating condition includes a reference temperature of the actuator, a reference pressure in the common-rail, a reference actual displacement amount of the movement member and a reference voltage of the actuator, and

wherein said setting means calculates difference values between the actual temperature and the reference temperature, the actual common-rail pressure and the reference common-rail pressure and the actual displacement amount and the reference displacement amount so as to calculate a target voltage by which the actuator is charged according to the calculated difference values and the reference voltage.

13. A control system for controlling a plurality of actuator devices according to claim 12, wherein said reference voltage and the reference temperature are measured from each of the actuator devices which operates under the reference common-rail pressure and the reference displacement amount so that the measured reference voltage and the reference temperature are stored on the storing means.

14. A control system for controlling a plurality of actuator devices according to claim 13, wherein said reference displacement corresponds to a displace amount of the movement member when it moves to a full lift position so that the movement member is seated to the high pressure port.

15. A control system for controlling a plurality of actuator devices according to claim 13, wherein said reference displacement corresponds to a displace amount of the movement member when it moves to a half lift position so that the movement member is located between the high pressure port and the low pressure port.

16. A control system for controlling a plurality of actuator devices according to claim 5, wherein said actuator of each of the actuator devices is a magnetostrictive actuator, and said condition of energization includes a current for causing the actuator to form a magnetic field.

17. A control system for controlling a plurality of actuator devices according to claim 5, wherein each of said actuator devices is an injector having a valve member or a needle for lift control, said injector being configured so that the actuator makes displacement the valve member or the needle.

18. A control system for controlling a plurality of actuator devices according to claim 5, wherein each of said actuator devices is communicated with a common-rail, and said actuator of each of the actuator devices is subjected to a fuel pressure supplied from the common-rail, and

wherein said setting means is operative to correct the condition of energization of each of the actuator devices according to a difference between an actual fuel pressure and a fuel pressure in a reference operating condition.

19. A control system for controlling a plurality of actuator devices according to claim 5, further comprising a plurality of storage mediums provided for the actuators, respectively, each of said storage medium storing thereon information corresponding to each of said individual data and means for transferring the information of each of the storage mediums to the storing means.

20. A control system for controlling a plurality of actuator devices according to claim 19, wherein said setting means is configured to a nonvolatile memory, each of said storage mediums is configured to a code pattern, said code pattern being formed on the corresponding actuator or actuator device and permitted to be optically read, each of said code pattern including each of said individual data, and

wherein said transferring means comprises an optical scanner for reading each of the individual data from each of the code pattern so as to write each of the read individual data on the storing means.

21. A method of controlling a plurality of actuator devices in each of which an actuator is installed, said actuator being deformed according to an amount of energy, said energy being kept in the actuator by energization, said control system, said method comprising:

storing on a memory individual data each specifying a condition of the energization of each of the actuator devices, said condition of the energization permitting energy to be supplied to each of the actuator devices, said energy being required for making each of the actuator devices

a predetermined operating state; and

setting the condition of energization to each of the actuator devices according to each of the stored individual data.